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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/667,504	09/22/2000	Peter Larsson	040000-749	9723

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EXAMINER

VARTANIAN, HARRY

ART UNIT	PAPER NUMBER
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2634

DATE MAILED: 12/02/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/667,504

Applicant(s)

LARSSON, PETER

Examiner

Harry Vartanian

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-26 is/are allowed.
- 6) ☒ Claim(s) 1,4-6 and 9-11 is/are rejected.
- 7) ☒ Claim(s) 2,3,7 and 8 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Detailed Action

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 4-6, and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace et al(US Patent #6473467) in view of Kumar(US Patent #6005894). Regarding Claims 1 and 6, Wallace et al discloses an OFDM transceiver with multiple antennas at the transmitter(See Fig 1a) that uses cyclic prefixes "to retain orthogonality of the OFDM symbol, which is typically destroyed by multipath."(Column 26, Lines 1-6) He uses a cycle prefix generator that "repeats a portion of the time-domain representation of the OFDM symbol to form the transmission symbol for the specific antenna."(Column 20, Line 66 to Column 21, Line 1) Regarding Claim 5, he defines a cyclic prefix as "a portion of an OFDM symbol (usually the front portion, after the IFFT) that is wrapped around to the back of the symbol. The cyclic prefix is used to retain orthogonality of the OFDM symbol, which is typically destroyed by multipath."(Column 26, Lines 2-6)

Wallace et al fails to mention the use of guard intervals composed of samples from the end of the signal in his transmitter diversity scheme.

However, Kumar states that "OFDM systems also commonly incorporate an extension of the symbol interval by a further amount of time known as the guard interval...which is typically generated by appending a null(zero) signal or a partial cyclic extension of the previous symbol, but its existence provides a period of time in which deleterious

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intersymbol interference may occur without disrupting the operation of the receiver.”(Column 26, Lines 57-65) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that Wallace et al’s communication system use guard intervals, as disclosed by Kumar. The motivation to combine these technologies is that a guard interval is commonly used in packet data communication systems to combat intersymbol inference caused by multipath.

Regarding Claim 4, Wallace et al discloses wrapping the front portion of the symbol to the back in order to reduce the correlation, i.e. create orthogonal paths, between the multiple antenna paths. Wrapping the back portion of the symbol to the beginning, as disclosed in Claim 4, would reduce the correlation between symbols in a similar manner. Therefor, it would have been obvious to one of ordinary skill in the art to implement the applicant’s system by wrapping the cyclic prefix disclosed by Wallace et al from the end of a signal to the beginning of signal.

Regarding Claim 9, Wallace also discloses the use of inverse fast Fourier transform in his transmitter(Fig 1a). Moreover, Wallace discloses the use of a full channel state information (CSI) that sends “sufficient characterization of the propagation path (i.e., amplitude and phase)” of the transmission path to the transmitter to perform gain control at the transmitter (Column 8, Lines 53-63).

For Claims 10 and 11, Kumar does state the specific placement of the guard interval in the front or back of the symbol. The guard interval can be placed at either the beginning or the end of each symbol at the discretion of one of ordinary skill in the art. Either position results in protection against intersymbol interference and the selection is a design choice.

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Claim Objections

2. Claims 2-3 and 7-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Allowances

3. Independent Claims 12-26 were allowed because of the specific description of the shifting operation on antenna paths 1 and 2, which was not disclosed in independent Claim 1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 703.305.8698. The examiner can normally be reached on 9-5:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703.305.4714. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is NONE.

Harry Vartanian
Examiner
Art Unit 2634

HV


STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
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